

**Entrance exam program
for the postgraduate Ph.D. programme
in CHEMICAL SCIENCE
(Subject code: 03.06.01)**

Analytical Chemistry

Subject of Analytical Chemistry. Purposes and Features of Analytical Chemistry and Analytical Service. Analytical Tasks: Detection, Identification, Definition of Substances. Chemical, Physical and Biological Analytical Methods of Chemistry. Types of Chemical Analysis: Isotopic, Atomic, Structural Group (Functional), Molecular, Substantial, Phase. Macro-, Micro-, Ultramicroanalysis. Local, Non-destructive, Remote, Uninterrupted, Non-laboratory (field) Analyses. Methods of Analysis. Chemical Methods. Acid-base Balance. Complexation. Redox Balance. Processes of Precipitation-dissolution. Organic Chemical Reagents Analysis. Gravimetric Methods. Titrimetric Methods. Oxidizing Reductive Titration. Complexometric Titration. Precipitation Titration. Kinetic Methods. Biochemical Methods. Electrochemical Methods. Potentiometry. Coulometry. Voltammetry. Conductometry. Physical Methods. Methods of Atomic Optical Spectroscopy. Atomic Emission Spectroscopy. Atomic Absorption Spectrometry. Atomic Fluorescent Spectroscopy. X-ray and Electron Spectroscopy Methods. Methods of X-ray Analysis (PCA). Methods of Molecular Optical Spectroscopy. Spectrophotometry. Luminescent Methods. IR and Raman (combination scattering) Spectroscopy. Methods of Mass Spectrometry. Resonance Spectroscopic Methods. Nuclear-physical and Radiochemical Methods. Activation Analysis. Radiochemical Methods: Methods of Local Analysis and Analysis Surface. Biological Methods. Chromatographic Methods. Gas Chromatography. Gas-adsorption (gas-solid phase) Chromatography. Gas/ Liquid Chromatography. High Performance Capillary Gas Chromatography. Supercritical Fluid Chromatography. Liquid Chromatography. High Performance Liquid Chromatography. Ion Exchange chromatography. Ionic Chromatography. Ion-pair Chromatography. Exclusive Chromatography. Affine Chromatography. Thin-layer Chromatography. Sorption Methods. Extraction. Metrology and Chemometrics. Metrological Basis of Chemical Analysis. Computer methods in analytical chemistry. Automation Analysis. Analysis of Specific Objects. Analytical Cycle and Stages of Analysis. Sampling and Sample Preparation. The main objects. Geological Objects. Metals, Alloys and Products of the Metallurgical Industry. Materials of the Nuclear Industry. Inorganic Compounds. Organic Matter. Biological and Medical Objects. Food Products. Objects of the Environment.

Recommended literature:

1. Nanobiotechnology [Electronic resource]: workshop / ed. A. B. Rubin. - 2nd ed. (e.) - Moscow: BINOM. Lab Knowledge, 2013. - 401 p. 2. Tyukavkina, N. A.
2. Bioorganic chemistry [Electronic resource]: textbook / N. A. Tyukavkina, Yu. I. Baukov, S.E. Zurabyan. - Moscow: GEOTAR-Media Publ., 2014. - 412 p.: pict. 3. Permyakov, E. A.
3. Metal binding proteins: structure, properties, functions [Text]. - Moscow: Nauchnyj Mir Publ., 2012. - 541 p.